1.0 BACKGROUND

The purpose of the Wetland Hydroperiod Monitoring study is to improve our understanding of hydrologic structure and function of wetlands and to understand wetland sensitivity to hydrological, anthropogenic and climate change impacts.

This initiative will assist with:
1. Future land-use planning
2. Impact assessment
3. Wetland restoration initiatives and
4. The evaluation of the wetland integrity in the watershed.

This project builds upon CVC’s existing Terrestrial Monitoring Program which currently studies the structure, function and composition of floral and faunal communities within the Credit River Watershed, but currently limited capabilities to draw conclusions about the hydrology within wetlands. Data from this project will be paired with current Terrestrial Monitoring data to identity linkages between hydrological function to trends observed in floral and faunal indicators.

2.0 SITE SELECTION

Wetland hydroperiod monitoring sites are located at a subset of terrestrial monitoring wetland plots. Sites with the following characteristics are being selected:

- Deciduous swamps with either mineral or organic substrates
- Homogenous vegetation community structure
- Located on either CVC or public property
- Preferably isolated or palustrine wetland communities

Sites are also being selected for effectiveness monitoring. Effectiveness monitoring is an approach for monitoring pre- and post-development impacts on natural features. Sites for effectiveness monitoring will be selected from terrestrial communities that are currently subject to the greatest development pressures projected to occur in the area within the next 10 years.

These communities include:
- Green Ash Mineral Deciduous Swamps
- Black Ash Mineral Deciduous Swamps
- Freeman and Silver Maple Deciduous Mineral Swamps

Acknowledgements:
We wish to thank numerous internal and external specialists for their expertise and continued support toward this project.

3.0 MATERIALS AND METHODS

3.1 EQUIPMENT AND CONFIGURATION

In order to relate hydrologic data to vegetation, hydrologic monitoring equipment are placed in close proximity to the vegetation monitoring plots. Three permanent hydrologic stations will be installed in each of the wetlands located at the 40m transect post, the 10m transect post and in an adjacent upland community.

**Equipment**

- **Equipment**: Barometric pressure gauge
- **Quantity**: 1
- **Configuration**: Will be placed in an inconspicuous location within the wetland.

**Equipment**

- **Equipment**: Piezometers
- **Quantity**: At least two nested piezometers (1m and 2m deep, screened 15cm) at each of the three stations. Additional piezometers may need to be installed where soil textures are variable enough to influence water movement.

**Date**

- **Date**: 10-Dec-11

**Equipment**

- **Equipment**: Surface water data logger
- **Quantity**: 2
- **Configuration**: One each at the 10m and 40m stations.

**Equipment**

- **Equipment**: Monitoring wells coupled with data loggers
- **Quantity**: 4
- **Configuration**: Two wells, one shallow (35cm) from 10cm below the surface) and one deep (shallow up to 2m from 10cm below the surface) each at 10m and 40m station.

**Equipment**

- **Equipment**: Soil moisture probes coupled with data loggers
- **Quantity**: Variable
- **Configuration**: Number of probes and installation depths determined according to where soil conditions are not permanently saturated within the rooting zone.

**Sampling**

- **Sampling**: Barometric pressure
- **Sampling**: One nest of probes at 10m, 40m and upland stations with 3-5 probes at predetermined depths.

**Piezometers coupled with data loggers**

- **Piezometers coupled with data loggers**: 6+

**PRELIMINARY FIELD INVESTIGATIONS**

- **Wetland evaluations**
- **Ecological Land Classification (ELC) and**
- **Soil test pits and/or cores**

**4.0 PILOT SITE: KEN WHILLANS WETLAND**

**TERRESTRIAL COMMUNITIES**

The terrestrial monitoring plot encompasses two ELC community types:

- The first 20m of the plot are located in a Willow Mineral Thicket Swamp (SWT2-2).
- The last 30m of the plot is classified as a Freeman Maple Mineral Deciduous Swamp (SWD3-3).

**HYDROPERIOD EQUIPMENT**

- **Piezometers and Monitoring Wells**
- **Installation Details**: Monitoring wells coupled with data loggers

**Piezometer and Monitoring Well Groundwater Levels**

**MONITORING FREQUENCY**

- **From April to November**
- **From thaw to freeze**
- **Ground water and surface water loggers record hourly**
- **Soil moisture loggers record at 10 minutes intervals**

**Preliminary Ground Water and Surface Water Results**

1. Diurnal Fluctuations

Temporal fluctuations in groundwater are witnessed daily and seasonally. The fluctuations indicate the influences of water uptake by vegetation and the subsequent transpiration occurring during daylight hours. Diurnal fluctuations seem to be affected by actively growing vegetation and precipitation events.

2. Significant Rainfall Event Influences Groundwater

The observed rapid response of the piezometer to rainfall suggests the mineral substrates (with very fine sand and loam) are highly transmissive. During some rainfall events, the soil becomes saturated and the groundwater level rises above ground surface.

3. Similar Groundwater Signatures

Groundwater levels recorded in piezometers and monitoring wells have almost identical hydrologic signatures.

**Acknowledgements**

We wish to thank numerous internal and external specialists for their expertise and continued support toward this project.

**Supplementary References**

- **Precipitation Source**: Environment Canada (2011). Credit River at Boston Mills